
Space Weather Forecast

Issued on Tuesday, 19 December 2023 at 13:21 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of isolated Moderate-class flares throughout. Slight chance of G1 intervals.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity is Low, with a peak common class flare at 19/0304 UTC. Ten sunspot regions feature on the visible disc. One in the southeast is the largest, with continued growth. Two in the northeast have displayed slight increase in areal extent and proliferation of intermediate spots. The new region which has rotated around the northeast limb appears moderately large with opposite polarity leader and trailer portions, but is difficult to analyse completely due to foreshortening. The final spot in the southwest has developed some magnetic complexity. All other spots are small and simple.

No new Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: The solar wind environment was characterised by previous coronal mass ejection influences, followed by the onset of a coronal hole high speed stream late in the UTC day on 18 Dec. Solar wind rose from slightly elevated to strong. The interplanetary magnetic field was mostly moderate initially with a peak at 18/1930 UTC, before falling to weak from 18/2300 UTC onward. The north-south component varied moderately until following a weakening trend similar to above and becoming largely positive. Resultant geomagnetic activity was largely Quiet to Unsettled (Kp 1-3), but with a G1 (Kp5) interval from 18/2100-2400 UTC.

Energetic Particles / Solar Radiation: Proton flux has been at Background levels, with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low with a chance of becoming Moderate with isolated Moderate-class flares. The greatest risk of significant flares is currently from two spots in the eastern hemisphere.

Solar Wind / Geomagnetic Activity: A weak coronal mass ejection arrival is possible later day 1 or early day 2 (19 or 20 Dec). Solar winds are currently Strong due to a coronal hole high speed stream. This connection is expected to continue through to the middle of the week with speeds waning to Elevated or Slightly Elevated levels. From day 3 (21 Dec), there is a chance of the arrival of a further coronal hole high speed stream, with Elevated or Strong solar winds speeds seen at Earth once again, before a gradual relaxation back to Slightly Elevated or Slow-Ambient levels later day 4 (22 Dec) or beyond.

Geomagnetic activity should remain largely Quiet to Unsettled, with a chance of Active conditions and a slight chance of a G1/Minor storm interval upon the arrival of a weak coronal mass ejection on day 1 or day 2 (19/20 Dec), or the high speed stream on day 3 or day 4 (21/22 Dec).

Energetic Particles / Solar Radiation: Solar radiation storms are considered very unlikely.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	Yes	20	10	20	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	35	35	35	35
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)